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JOURNAL

CITY PLANNING DIVISION

Proceedings of the American Society of Civil Engineers

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CONTENTS

February, 1956

Papers

(Discussion open until June 1, 1956)

Paper		Page
879	Planned Industrial Districts by Victor Roterus	879-1
886	Industry Location Factors by Jerome P. Pickard	886-1
893	Transportation Planning: The Port—A Focal Point by Roger H. Gilman	893-1
894	Transportation Planning: The Airport, A National Facility by Wilfred M. Post, Jr.	894-1

Division Activities

1956-4	Newsletter	1

JOURNAL

CITY PLANNING DIVISION

Proceedings of the American Society of Civil Engineers

PLANNED INDUSTRIAL DISTRICTS[1]

Victor Roterus[2]
(Proc. Paper 879)

SYNOPSIS

Planned industrial districts are the industrial counterpart of a planned residential subdivision. As such they are subdivided and developed (in entirety or in installments) for a community of industries under a definite plan and under such controls as will enhance their aesthetic appearance and operating efficiency.

Advantages to prospective manufacturers include an attractive and immediately available site with utilities already installed rather than promised. From the community viewpoint, the development of a relatively large parcel of land permits the community to segregate industrial activity into one or several desirable locations which can be better controlled and zoned. Furthermore, definite economies may be realized in utility extensions and government services as against a scattered industrial development.

If each family unit on earth were economically self-sufficient, producing what it consumed and no more, we would have no cities or metropolitan areas. Urban areas are essentially a phenomenon of economic unbalance when viewed from a local area sense. That is, urban growth results from a production of certain types of goods and services that are in excess of what the population of the urban area consumes and yet are in demand outside the area. Fundamentally, this production in an urban area is non-agricultural, non-rural, and hence relatively non-land consuming. Conceivably, if agricultural, rural products sufficient to satisfy the average family could be produced in the land dimensions occupied by a lathe or machine tool, then perhaps we could have concentrations of population akin to our present urban areas, and at the same time these concentrations could be completely self-sufficient in the sense that the urban area produced and consumed what it needed without much recourse

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Note: Discussion open until June 1, 1956. Paper 879 is part of the copyrighted Journal of the City Planning Division of the American Society of Civil Engineers, Vol 82, CP 1, February, 1956.

1. Presented at the Annual Meeting of the American Society of Civil Engineers, City Planning Division, Hotel Statler, New York City, October 27, 1955.
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to outside sources of either materials or markets. This condition is conceivable, but it obviously does not exist. Instead the urban area is a non-agricultural, non-rural phenomenon dependent on its ability to produce goods and services with small space requirements which are exchanged for goods and services generally requiring larger space requirements for an equivalent value of production. The more such an area produces for exchange with other areas, the greater its growth. Those activities producing goods or services for outside markets (such as certain types of manufacturing or regional medical services) or receiving their income from outside sources (such as a regional office of the Federal government) seem to be the initial spark in urban growth. The partly local services—such as the retail store, dairy products manufacturer, or the dentist's office—always seem to follow upon the other type of development.

Accordingly, city and metropolitan planning—once concerned almost exclusively with aesthetic objectives and in providing protection to better class residential areas—is concerned now more and more with providing for the needs of the growth-generating activities in the general land use plan. Inasmuch as the manufacturing activity is a principal generator of urban growth in most cities and metropolitan areas, its site and service requirements are deserving of especial attention in urban planning.

In this connection a device or tool for housing and servicing industry—the organized or planned industrial district[3]—has not received the attention it deserves from all those interested both in the industrial development of areas and in directing future urban growth into more aesthetic, orderly and efficient patterns.

An organized industrial district or planned industrial park is subdivided and developed (in its entirety or in installments) for a community of industries in accordance with a plan providing for streets, rail lead tracks, and utilities installed—rather than promised—prior to the sale of the constituent sites to prospective industrial occupants. As such, the plan for orderly development of the tract must provide for adequate control of the land and buildings through zoning and restrictions with a view to protecting the investments of both developers of the district and the industries occupying the improved sites.

Such an organized district, or planned subdivision for industry, is a logical, man-directed response to present day trends and conditions in the location of industry in metropolitan areas. Many types of industry are using horizontal-line production methods best housed in a land-consuming, one-story building. More employees are driving to work and parking their cars instead of using public transit—another factor arguing for more space in the plant site. Space is also required for loading docks and for employee cafeterias and recreational facilities. Furthermore, profiting by lessons from the past, land is now being reserved by industry for future expansion needs (note that the new plants usually have at least one temporary wall). These trends have forced industry to seek outlying sites in the metropolitan area where larger parcels of vacant land in single ownerships are available and where the land is priced by the acre rather than the square foot. Defense security is another factor of more recent cogency in inviting location of industry at some distance from in-town industrial and population concentrations.

Definite advantages from establishing industrial districts flow both to

3. In England, a public counterpart is called an "Industrial Estate."

industry and to the community. From the viewpoint of prospective manufacturers, they are spared the many worries attending a search for a site. Properties in a well-planned district are already parcelled, rail right-of-way arrangements are already made, and utilities are not just promised but installed and ready for service in definite quantities and at specific rates. Plant buildings are often available for occupancy at sale or lease, and in other cases district architects and contractors will carefully supervise the design, construction and maintenance of new buildings according to specifications. The manufacturer will not be bothered by zoning problems and possible indignation meetings of abutting residential property owners.

Communities and metropolitan areas are finding real advantages in the organized industrial district concept. By developing a relatively large parcel of land, the community can segregate industrial activity into one or several desirable locations which can be better controlled and zoned.

By controlling the district through zoning and restrictive covenants, better and more stable firms can be attracted to the community with a resultant beneficial effect on its economic base. Control of architectural design and building materials results in aesthetically pleasing plants which are conducive to superior employee working conditions. In addition, off-street parking and loading dock requirements will aid in maintaining uncongested freight and traffic movement through the industrial area.

Finally, there is one very important aspect of the planned industrial district that should not be overlooked—that is the focus that the industrial district can lend to planning of metropolitan areas. Development in the outlying metropolitan area can be either thinly scattered over the entire landscape with its attendant disorders and high cost of utilities, schools, and other services, or development in the outskirts can be limited to a few areas in the interests of fostering compact satellite communities each of which can support a full complement of utilities and services at reasonably good quality standards. In order to achieve the latter type of planning objective—that of progressive, compact development of selected areas—the zoning tool has thus far been ineffective not only because of its absence in many instances, but also because of its very definite limitations. The organized industrial district provides a focal point for community planning in the outskirts of metropolitan areas which, when used in conjunction with the zoning tool, provides at least a better chance of effecting orderly and efficient development. This is so simply because in starting with the organized industrial district you are planning the place of work. Other elements in community development always follow the job opportunities.

From our study of the planned industrial district, a number of summary conclusions seem pertinent:

1) Industrial districts cannot be developed just anywhere. Planned industrial parks are most useful in an area where good industrial sites are scarce, are difficult to assemble or acquire, and difficult to preserve against the encroachments of residential and commercial uses, and where the demand for industrial land is strong. These conditions are frequently found in or around the outskirts of urban or metropolitan areas. For example, of the 118 districts this Office inventoried in its national survey, we found that 93, or four out of every five, of the total were located in or near urban metropolitan areas having a population of 100,000 or more. Another reason that the planned industrial parks are largely located in or near the more populous urban centers is the fact that, besides appealing to the light and medium types of

manufacturing, many of them house wholesale or distributing activities associated with the network of transportation facilities that normally converge on these centers. Smaller towns are less apt to attract such types of industry.

2) Successful development is often largely predicated on the fact that the vacant land developed was held as one, or not more than several, parcels at the time of purchase; the land was relatively inexpensive at time of purchase; the land was in most cases located outside of the central cities; the land was assessed at a relatively low rate for taxing purposes at the time of purchase; the developers were willing to make long-term investments in the development and improvement of the tracts; and the developers were willing to face the possibility of slow development—and operation without profit for at least several years.

3) Adequate protective controls result not only in the preservation or increase in land values for the developer and occupants, but also promote harmony and compatability with nearby residential areas.

4) A well-designed tract layout is an important factor contributing to the successful development of the district. Essential elements of a good layout include flexibility—so that warehousing as well as manufacturing industries can be attracted; block patterns designed to conserve land and permit the best possible arrangement of facilities; and streets and trackage designed to minimize traffic congestion.

5) About 200 acres has been found to be a good tract size for the profitable operation of a district where it is expected that prospective manufacturers will require plants averaging about 50,000 square feet. Our survey indicates that most of the districts in the midwest are about this size, but more of them located in the larger cities in the East and West are considerably larger.

6) It is evident from an inspection of many established districts in the country that inadequate planning consideration has been given to present and future requirements for off-street parking. Requiring about 300 square feet per space, you can park about 150 cars per acre.

7) An organized industrial district appeals most strongly to certain types of industry. These are largely limited to the light and medium types of manufacturing and the processing-distributive types of activity, such as food products and soft drinks.

8) Providing industry with a "package plan" of district 1 services (including architectural, engineering, construction and financial assistance and other services) is a desirable function of organized industrial districts. Although presently provided by relatively few districts, the possibility of adding this type of service where feasible should be explored by other districts.

9) The cost of developing an industrial district is high. Improvement runs about 25 cents a square foot—higher in the larger cities. However, relatively high development investments can be made since manufacturers looking for locations are willing to pay the added expense involved in improving the site and being assured of the immediate availability of utilities and other facilities. And it is encouraging to note that improved sites in a planned district bring anywhere from 50 cents to a dollar per square foot—some higher.

10) A sound and energetic promotional program is an essential element in the comprehensive district plan. Promotional effort must be based on a knowledge of the kinds of industries best suited to local resource advantages.

Paper 886 CP 1

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INDUSTRY LOCATION FACTORS

Jerome P. Pickard[a]
(Proc. Paper 886)

I. General Factors

In the study of industry location as it relates to our local communities and to industrial development planning, we find that we must relate the present and future development of manufacturing in our local area to the national pattern as a whole, then to regional patterns, and finally, to local metropolitan area or labor market area patterns in order to place our local study and planning into proper perspective. We shall proceed from the national and general to the level of the local and specific in our study.

As a result of enormous and rapid technological advances, industry today enjoys a greatly expanded mobility and freedom of choice in location. Transportation, in particular, has experienced a revolution in the 20th century which has greatly facilitated the movement of such important locational factors as labor, fuels, and power, as well as improving access to markets. We should not say that industry is any less dependent upon basic locational factors than formerly, but, rather, that the area of choice for a plant location has been vastly extended. Some types of local-market industries formerly confined to the central city may now be found dispersed into the suburban area. Other types of industry serving regional or national markets have also experienced a greater freedom of locational choice.

In the United States generally, the pattern has taken the form of greater dispersion of industry among the various regions of the country. The less intensively industrialized regions have experienced a more rapid growth of manufacturing industry in recent years than the earlier regions of industry concentration in the Northeastern quarter of the country. The facts are clearly brought out in Table 1, which shows the relationship of manufacturing employment to population in the nine major regions of the United States in 1939, 1947, and 1954. The extreme variation between the ratio of the most industrialized region, New England, and the least industrialized, the Mountain States, decreased from 6.1 times in 1939 to 5.3 in 1947, and 4.4 times in 1954.

Note: Discussion open until June 1, 1956. Paper 886 is part of the copyrighted Journal of the City Planning Division of the American Society of Civil Engineers, Vol. 82, CP 1, February, 1956.

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TABLE 1. RELATIONSHIP OF MANUFACTURING EMPLOYMENT & POPULATION, UNITED STATES, BY REGIONS, 1939, 1947, and 1954

REGION	1954 Mnfg.Emp't	1954 Population	1954 per 1000	1947 Mnfg.Emp't	1947 Population	1947 per 1000	1939 Mnfg.Emp't	1939 Population	1939 per 1000
New England	1,440,300	9,762,000	147.5	1,474,684	9,039,000	163.1	1,121,152	8,438,000	132.9
Middle Atlantic*	4,464,900	35,935,000	124.2	4,234,571	32,237,000	131.4	2,961,737	30,266,000	97.9
South Atlantic*	1,456,900	18,952,000	76.9	1,242,662	16,645,000	74.7	906,876	14,879,000	61.0
Central Southeast	745,500	11,467,000	65.0	633,765	11,019,000	57.5	410,008	10,682,000	38.4
Central Southwest	739,800	15,333,000	48.2	550,241	13,936,000	39.5	330,516	12,975,000	25.5
East North Central	4,564,300	32,804,000	139.1	4,317,892	29,151,000	148.1	2,692,815	26,457,000	101.8
West North Central	960,200	14,568,000	65.9	785,064	13,447,000	58.4	490,651	13,503,000	36.3
Mountain	189,900	5,692,000	33.4	141,638	4,568,000	31.0	89,409	4,100,000	21.8
Pacific	1,362,300	16,671,000	81.7	913,787	13,405,000	68.2	523,439	9,580,000	54.6
UNITED STATES	15,924,100	161,195,000	98.8	14,294,304	143,446,000	99.6	9,527,306	130,880,000	72.8

* Delaware, Maryland, and the District of Columbia are included in the Middle Atlantic Region.

Source of Data: U.S. Bureau of the Census, mid-year population estimates for 1939, 1947, 1954
U.S. Bureau of the Census, Census of Manufactures, 1947 (with data for 1939)
U.S. Dept. of Labor, Bureau of Labor Statistics. Employment and Earnings, May, 1955 (estimated manufacturing employment for the year 1954)

The greatest relative increase in the intensity of manufacturing employment over the 15-year period took place in the Central Southwest (89%), West North Central (82%), Central Southeast (69%), Mountain (53%) and Pacific (50%) regions, in that order. The only region in the more highly industrialized Northeastern U. S. which gained at a rate in excess of the national average (36%) was the East North Central Region (37%).

During the most recent 7-year period 1947-1954, the three regions of greatest industrial concentration occupying the Northeastern U. S. have all decreased in the intensity of manufacturing employment, while all of the other regions have increased. The East North Central Region now has the greatest total manufacturing employment, and probably will rank first in intensity by 1960.

Areas and regions of rapid population growth have experienced generally an even greater expansion of industrial employment. Many of these areas are characterized by relatively high wage levels and attractive living conditions. A belt of these areas extends across the southwestern portion of the United States from Texas through New Mexico, Arizona, and California. Manufacturing industries have been attracted to these areas not merely because of their growth, but also because they are areas to which all types of personnel can be attracted.

Personnel. Personnel represents the greatest single cost factor for most industries. Today, employees have a greater mobility in two respects: (1) in the local metropolitan area, commuting distances to work have been greatly increased by the automobile, highway, and freeway so that 25 miles each way is not an infrequent commuting distance; and (2) intercity migration has become very widespread. Census Bureau population surveys in recent years reveal that between 3 and 4 percent of the American civilian population change residence from one state to another annually.

We may subdivide personnel into three major components: managerial and technical personnel, skilled workers, and semi-skilled and unskilled workers. An industry progresses continually toward further automation and more complex processes, the demand for the first group has increased. Since there is a marked scarcity of readily available trained personnel in most fields, this could be a locational factor of great moment. However, we find that this group moves rather readily about the country, and therefore, exerts only a secondary effect on location, in their relation to the characteristics of the community. Some of these highly skilled and trained technicians and managers are rather demanding in their quest for community services and cultural assets.

The second group, skilled workers, are among the hardest to move. Very often these people are rooted in their home community. They have neither the financial incentives to move which may attract the higher echelons (managers and engineers), nor do they have the ease of movement of the unskilled laborer. The existence of a substantial labor pool of skilled workers is therefore still a powerful location factor for many types of industry. The skilled labor factor has been a great asset in many New England communities which have readjusted their industrial structure.

Unskilled and semi-skilled labor cannot be said to constitute a strong location factor. Relatively few industries and relatively few areas appear to be strongly influenced by a shortage of unskilled labor. Industries which depend

chiefly upon the first and last groups of personnel have been most free and footloose during the last decade. Those industries which depend heavily upon the skilled worker have had much less freedom of movement, and have changed their locational pattern relatively little.

Fuels and Power. The energy base for our manufacturing industries has undergone revolutionary changes since 1900. In that year, coal furnished 89 percent of our entire industrial and domestic energy requirements. The location of our major developed coal deposits was an important and significant factor in the location of industry. Now, in the year 1955, petroleum and gas supply about 64 percent of our total energy requirements. A network of more than 200,000 miles of pipelines carried our liquid and gas fuels from producing fields and refineries to the consuming centers, and tankers provide coastwise shipment. With the long-distance transmission of electric power added to this pattern, energy has become highly mobile. Industrial energy requirements are supplied effectively and cheaply over a vast area of our national territory.

Only a few industries which need enormous quantities of fuels or power, as primary aluminum or petrochemical industries are sufficiently sensitive to the differential cost of these items to feel a strong locational pull toward the locations where these are cheapest. The vast majority of industries are relatively free to exercise a locational choice in response to other factors, with fuel and power moving easily and efficiently to the plant.

Markets. Transportation improvements have greatly enhanced the market access of many manufacturing industries. More than 300,000 miles of good paved roads have been added to supplement our network of 225,000 miles of railroads, and, for many industries, roads have supplanted the use of the railroad. The cheapening and improvement of transportation has reduced the relative importance of transportation costs for most industries, making them more sensitive to differences in other costs incurred for labor, taxes, utilities, etc. At the same time, location is still a very competitive factor, and expressed as a time factor, it may be of great importance in serving a given market area. Thus although the entire pattern of transportation and distribution has been speeded up, this has not necessarily had the effect of concentrating industry in favored locations, because the service aspect encourages industry to distribute itself into different market areas.

Taxation. Taxation is one of the most popular topics whenever industry location is discussed. A great many communities provide various forms of tax abatement as an inducement for industries. Other communities stimulate the dispersion of industry by tax structures which encourage industries to reduce their costs by moving to other jurisdictions. Though the real estate tax rate and income taxes are most often quoted, actually, the significant tax factors are:

1) Total taxation (excepting Federal): State, county, and local, all taxes.
2) Community services provided in return for taxes

Many communities and counties which loudly proclaim the virtue of low taxes are speaking of today, not tomorrow. Others are speaking merely of local tax rates. Communities which do not advertise low tax rates, may, in fact, offer the greatest bargains to prospective industry if their existing capital improvements are substantial and services offered for industry and its personnel represent a good return for the tax payment.

Federal Dispersal Programs. These programs, particularly the tax-amortization program, have had an effect upon the location of industry. The overall effect has been felt in the nation as a whole; undoubtedly this program has played a significant role in the greater dispersion of manufacturing industry. However, this program has not had a sweeping effect for at least two major reasons:

1. Consumer-goods industries, and certain others not considered vital for immediate defense needs have not been appreciably affected by the program, directly.
2. A considerable amount of expansion under the program actually took place in highly industrialized areas. It is true that the program encouraged dispersal within these areas, but this might have occured in any case in response to economic factors and the availability of suitable sites for new plants.

Plant Sites. The widening of the area of choice for industry location has increased the factor of available plant sites as a location factor greatly. Communities which are engaged in industrial development work are keenly aware of this fact, and realize fully that they are directly competing with numerous other communities in their region. Increasing emphasis upon this factor has accelerated the development of planned industrial districts all over the country. It has been recently reported that new districts are being opened up at the rate of one per week.(1) Although many of these districts are relatively small in area, they have proved highly successful in many communities.(2)

Inertia. Inertia, or the adherence of industry to existing locations, is less significant today than formerly. In a period of rapid industrial expansion and technological change, accompanied by a large annual volume of new plant investment, new plants are being established in large numbers. It is only the great capacity of the American economy to consume goods which has prevented this high industrial birth rate from being accompanied by a high death rate. Obsolescence and extinction of industry are problems which are keenly felt only in a few branches of industry and in a relatively small number of communities.

Plant Investment. Those industries which had the greatest volume of expansion in the year 1953 (latest year for which data are available) were: 3

Industry	New Plant Investment, 1953
Petroleum refining	$ 430 million
Chemicals	290 "
Iron & steel & foundries	270 "
Misc. petroleum & coke products*	100 "
Aircraft & parts	85 "
Electrical machinery, misc.**	75 "
Non-ferrous metals	70 "
Motor vehicles & parts	70 "
Communication equipment	60 "

* Includes all SIC Group 29 excepting petroleum refining
** Includes all SIC Group 36 excepting communication equipment

The nine industries listed above accounted for 56 percent of the total new plant investment of $2,585 million in 1953. The concentration in terms of industries was, however, less than in terms of states, where only 10 states accounted for 70 percent of the total new plant investment:

TABLE 2. NEW PLANT INVESTMENT, AND RATIO TO VALUE ADDED BY MANUFACTURING, LEADING STATES, 1953

State	New Plant	Value Added	Ratio
Pennsylvania	$ 297 million	$ 10,794 million	2.75 %
California	249	8,153	3.05
Ohio	239	11,192	2.14
Texas	186	3,486	5.33
Illinois	179	10,112	1.77
Michigan	158	9,782	1.62
Indiana	135	5,205	2.60
New York	128	14,410	0.88
Louisiana	118	1,180	9.96
New Jersey	117	6,451	1.81
Massachusetts	33	4,630	0.72
UNITED STATES	$2585 MILLION	$ 121,659 MILLION	2.13 %

Compared with existing industrial production, the expansion in Louisiana and Texas in 1953 might be termed "phenomenal"; in California, Pennsylvania, and Indiana it was substantially above the average ratio of 2.13 %. New York and Massachusetts showed the lowest ratios of any of the 10 leading industrial states.

Other Factors. There are a host of other factors which may affect industry location in specific cases. Zoning regulations are frequently important for several reasons:

1) They provide industry protection for its own site against the encroachment of undesirable neighbors
2) The zoning regulations and map often will reveal a great deal in terms of the community attitude toward industry

Naturally, there is a great variation in both the quality and quantity of zoning regulation relating to industry. A study of the effect of this factor would supply subject matter for a paper of considerable size.

Our national water supply has received a great deal of attention in recent years. The 1953 Survey of Manufactures reveals that only certain industries are heavy users of water: iron & steel mills, chemicals, petroleum refining, and pulp, paper and paperboard industries accounted for 79 percent of our total industrial water consumption in 1953. For these industries, water is an important element of location. For most others, existing facilities will suffice, though a few industries which use water in process may be fussy about its chemical content and flavor (breweries, for example).

Climate is often cited as a very significant location factor. It is difficult to discern just which climatic factors made New England attractive for industry. Actually, of course, water, or humidity, is a significant element of climate, but we might readily generalize that climatic effects upon industry location are indirect, rather than direct factors.

Raw material sources have long been regarded as a prime factor in industrial location. Certain branches of industry, especially producers of building material supplies, metals, and other heavy or bulky products have obviously located processing plants in relation to material sources. However, the cheaper transportation and more complex process in present-day manufacturing have made industry less dependent upon proximity to materials than formerly.

One point is quite significant, however. There has been much emphasis upon "raw" materials. Many industries today use very insignificant amounts of raw material. They are consumers of the production of other industries—for example, a printing establishment (using manufactured paper, chemicals, and inks) or an electronic assembly plant (using manufactured metal forms, parts, and wires). Therefore, the existence of large industrial concentrations in certain areas of the country means the existence of a large and diverse source of material for industry in or near these areas. This has been a significant factor in the further development of our existing industrialized areas.

Summary - Factors. In conclusion we should not attempt to generalize, as any specific industry location factors will apply with varying cogency to a specific industry or to a specific community. Other factors which are not primarily locational in character, such as corporate structure, competition, and business management may play a significant role in expansion and plant location.

We have already discussed which industries are expanding most rapidly in terms of plant investment. In terms of employment, a different pattern emerges. In the period of industrial expansion from 1949 to 1953, U. S. manufacturing employment rose by more than 22 percent. The fastest growing industries during this period were: aircraft and parts, communication equipment, ships & boats, instruments, other electrical machinery, and machinery. The last two years 1953-1955 have been a period of readjustment following the Korean war crisis. During this period industrial employment in the U.S. shrank by 6.4 percent. The six leading growth industries in this period (all of which actually increased in employment) were: non-ferrous metals; concrete, gypsum & plaster; pulp, paper & board; cement; printing & publishing; and meat products.

IV. Metropolitan Area Factors

Since the 1950 Census, five of our major metropolitan areas have passed the halfway mark—they now have more than half of their respective metropolitan area populations outside the central city or cities. These are: Washington, D.C., St. Louis, Mo., San Francisco-Oakland, Calif., Buffalo, N.Y., and Miami, Fla. Only one major city, Atlanta, has moved in the reverse direction by means of a mammoth annexation to the city. Two other major metropolitan areas, Philadelphia and Detroit, are rapidly approaching the halfway milestone.

We tend to think of this suburban movement as an extension of the city outward. Though this is true in a sense, in nearly all metropolitan areas we find that the characteristics of population, business, and industry in the suburban area differ markedly from those of the central city. Certainly this is true of manufacturing industries.

Chart I. shows the average manufacturing plant employed in central city and suburban county areas for 25 leading standard metropolitan areas in 1947 (the 14 areas with over 1,000,000 population each, and 11 other areas having more than 75,000 employed in manufacturing). These 25 areas contained 49 percent of the total U.S. manufacturing employment in 1947. The tendency toward larger average plant size in the suburban area is very marked; only five industrial areas and one non-industrial area (Washington, D.C.) show a different pattern. At least three of these contain a special concentration of large plants within the city: Rochester, Akron, and Bethlehem, Pa. All of the ten largest industrial areas show a decidedly larger average plant size in the suburban area.

The chart does not reveal any particular separation of older cities versus newer cities, of western cities, versus eastern cities, though the smallest average plant size in suburban areas among the industrial areas is found in the Los Angeles metropolitan area, and the largest in the Baltimore area, where a small number of suburban plants (147 in 1947) are dominated by the gigantic establishments of the Bethlehem Steel Company (20,000 employed in 1947) and the Glenn Martin aircraft plant (14,000 employed in 1947).

Generally speaking, the suburban areas exhibit the following characteristics of manufacturing industry:

1) Larger than average plant size in employment
2) Greater concentration of types of industry which are characterized by large plant employment (see Table 3, following)
3) Greater concentration of newer industry types (motor vehicles, aircraft, instruments, electronics, plastics)
4) Industries requiring large plant area or site acreage
5) Industries which are basic in the area economy, i.e. serving primarily a non-local market
6) A scattering of small local-market industries, which tend to be somewhat smaller than their counterparts in the central city: printing, bottling plants, metal shops, bakeries, etc.

The last group listed above is a minor factor in the suburban areas of industrial centers, but may be relatively more important in areas which are not highly industrialized.

The industry structure of the suburban area contrasts sharply with the structure of the central city, which is usually more heterogeneous, has a concentration of smaller plants in terms of both space requirements and employment, and a concentration of local-market industries.

A recent study(4) on the relative growth rates of manufacturing (as measured by several indices) in central cities and suburban areas of the U.S. metropolitan areas reveals that there was a trend toward suburbanization in the period 1929-1939, which was stopped in the period of wartime growth in 1939-1947. In this latter period, the study failed to find a general movement to the suburbs, though in specific areas, such decentralizing movements occurred. However, serious shortages of construction materials hampered construction during the war, and industrial plant expansion was to a great extent restricted and controlled. In the recent period 1947-1953, there is evidence that the suburbanization of industry has increased, but we have at present data for only six areas to examine for purposes of comparison (see Table 4).

AVERAGE MANUFACTURING PLANT EMPLOYMENT, 1947

25 STANDARD METROPOLITAN AREAS

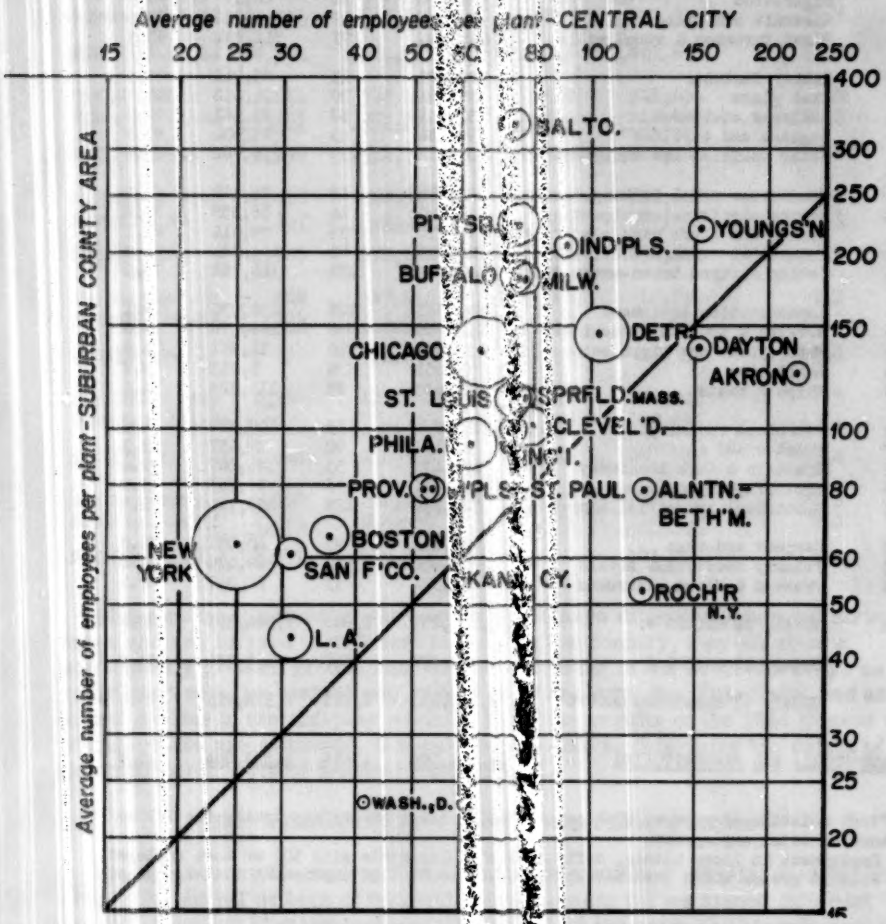

Chart I. Average Manufacturing Plant Employment, Central City and Suburban Areas, 25 Leading Standard Metropolitan Areas, 1947

(Area of circles proportional to total manufacturing employment)

TABLE 3. MANUFACTURING INDUSTRIES WITH LARGE PLANT SIZE DOMINANT, 1947 [a]

SIC GROUP	DESCRIPTION	1947 EMPLOYMENT	Large Plants	1947 EMPL,**	% in Large Plants
196	Small arms ammunition	8,050	4	8,031	99.8 %
301	Tires and inner tubes	115,657	38	113,320	98.0
211	Cigarettes	27,674	14	26,537	95.9
372	Aircraft and parts	219,611	59	205,652	93.6
331	Blast furnaces & steel mills	547,364	177	511,934	93.5
302	Rubber footwear	28,125	13	25,742	91.5
321	Flat glass	27,241	20	24,532	90.1
374	Railroad equipment	91,116	38	81,961	90.0
351	Engines and turbines	93,064	43	81,804	87.9
371	Motor vehicles and equipment	701,121	237	615,762	87.8
335	Nonferrous metal rolling,drawing	88,824	48	74,119	83.4
364	Engine electrical equipment	43,920	14	36,358	82.8
357	Office and store machines	97,778	35	79,314	81.1
282	Industrial organic chemicals	206,295	83	164,924	79.9
223	Cotton & rayon broad-woven fabric	455,009	311	346,964	76.3
366	Communication equipment	303,391	128	230,930	76.1
358	Service & household machines	220,286	88	167,476	76.0
375	Motorcycles and bicycles	15,615	10	11,851	75.9
195	Small arms	10,453	6	7,911	75.7
373	Ships & boats	149,655	59	111,325	74.4
291	Petroleum refining	145,806	55	108,387	74.3
387	Watches and clocks	40,181	20	29,457	73.3
352	Tractors & farm machinery	171,435	55	124,067	72.4
386	Photographic equipment	50,911	15	36,747	72.2
361	Electrical industrial apparatus	321,352	128	229,716	71.5
227	Carpets and rugs	57,211	23	40,051	70.0
333	Primary nonferrous metals	42,804	32	29,476	69.0
322	Pressed & blown glassware	89,302	53	60,047	67.2
SUM	TOTAL, 28 GROUPS *	4,369,251	1,806	3,584,395	82.0 %
	TOTAL, 16 GROUPS #	1,202,572	517	667,924	55.5 %
	TOTAL, 97 REMAINING GROUPS	8,722,481	2,341	2,304,925	26.4 %
GRAND TOTAL, ALL MANUFACTURING		14,294,304	4,664	6,557,244	45.9 %

* First quintile of groups, with employment in large plants accounting for 2/3 or more of total employment.
** Employment in large plants, defined as establishments with 500 or more employed.
\# Next 16 groups which have between 50.0 and 66.67 % of employment in large plants

[a] Data from U.S. Census Bureau, 1947 Census of Manufactures, Volume I, Chapter III. Missing data estimated.

TABLE 4. MANUFACTURING EMPLOYMENT IN SELECTED STANDARD METROPOLITAN AREAS, 1947 and 1953[b]

Area	1947 Census		1953 BOASI Data		% Change
	Plants	Employed	Plants	Employed	Employed
New York City	37,870	940,235	[illegible]59	1,020,129	8.5 %
Suburban NY-NJ	10,434	663,949	[illegible]42	821,524	23.7
NEW YORK-NE NJ	48,304	1,604,184	[illegible]01	1,841,653	14.8
Philadelphia	5,244	328,630	[illegible]98	341,654	4.0
Suburban Pa-NJ	2,155	203,862	[illegible]02	248,109	21.7
PHILADELPHIA	7,399	532,492	[illegible]00	589,763	10.8
Baltimore city	1,638	120,929	1,805	128,045	5.9
Suburban Md	147	49,133	197	68,853	40.1
BALTIMORE	1,785	170,062	2[illegible]002	196,898	15.8
Washington	428	17,815	566	18,751	5.3
Suburban Md-Va	204	4,658	306	8,641	85.5
WASHINGTON	632	22,473	872	27,392	21.9
St. Louis city	2,330	172,946	2,541	184,901	6.9
Suburban Ill-Mo	630	71,570	722	102,611	43.4
ST. LOUIS	2,960	244,516	3,263	287,512	17.6
San Francisco	1,990	61,574	2,077	60,758	-1.3
Suburban Calif	1,681	102,067	1,955	110,247	8.0
SAN FRANCISCO	3,671	163,641	4,032	171,005	4.5

Although the six metropolitan areas listed have different industrial structures and are located in different regions of the country, they all show a significantly greater growth rate of manufacturing in the suburban areas as contrasted with the central city, though only one city, San Francisco, had an actual decline in the six-year period. When the results of the 1954 Census of Manufactures are available, it should be possible to determine the extent of the suburban growth of industry generally.

III. Washington, D.C., Metropolitan Area Factors

We turn now to the study of industry location within a specific metropolitan area. The actual pattern of industrial development varies among different areas, according to many factors: the growth of the area, the structure of its industry, major transportation routes, market orientation of its industries, and other factors. For purposes of study I have selected the Washington, D.C. metropolitan area, with which I am most familiar.

First, it is desirable to establish some method of measuring the degree of manufacturing intensity and development of major industry groups. This may be achieved by the use of the concept of "normal" industry employment.

b. Data from U.S. Census Bureau, 1947 Census of Manufactures, Volume III, and County Business Patterns 1953.

"Normal" employment is a theoretical figure which measures the employment in industry which a metropolitan area would have if this employment were uniformly distributed across the United States in direct proportion to non-agricultural population. In March, 1953, the Washington Metropolitan Area had approximately 1,715,000 non-farm population, which amounted to 1.2699% of the total U.S. non-farm population of 135,049,000. This basic ratio is applied to the entire U.S. employment in a particular manufacturing industry to determine the level of industry employment which the Washington Metropolitan area would have at the theoretical level of uniform distribution. The deviation of the area employment from the "norm" presents us with a clear picture of the structure of the area industry, and we may refine the analysis from large groupings of industry to smaller groups—as far down as we are able to obtain data.

The Washington metropolitan area has a phenomenally low index of industrial employment—only 12.8 percent of the "normal" average for an area with its population. Only one of the twenty-one major industry groups, printing and publishing, is developed up to the "normal" level, which is used as a "100" value in plotting on Chart II. Only two other industry groups, food & beverages, and instruments, have indices in excess of 20. The last-named is not primarily a local market industry, whereas the first two groups are based primarily upon the local market area.

In terms of distribution of employment within the Washington area, 94 percent of printing & publishing, and 82 percent of food and beverage industry employment was located in the central city in 1953, whereas only 37 percent of employment in all other industries was located in the city. Some of these others, such as electrical machinery, instruments, and transportation equipment include firms which are chiefly Government contractors producing equipment for Defense agencies, while another group, the stone and clay products industries, produce for a local market which is particularly localized in the suburban area because of the relatively high rate of building construction in this area. Many of the building materials plants in the Washington area market their product almost entirely within a 15-mile circle from the plant, because of the weight of such materials and the consequent relatively high cost of transporting them. The competitive development of the industry with its plants forming a ring around the city, and a few located within the city itself, has intensified the localization of marketing.

The District of Columbia has acted as a "breeding ground" for some of the largest industrial establishments now located in the suburban county areas. These have moved out to obtain larger sites, better transportation access, or other specific requirements. Nevertheless, this outward movement has not particularly affected the industrial development of Washington itself, probably because the two largest industries are local-market oriented, and hence, have remained largely concentrated in the city.

An industrial survey we made in 1954 indicated that approximately 69 percent of the total manufacturing employment in the metropolitan area could be assigned to local-market industry, and only 31 percent was basic (i.e. non-local market) employment. Most of this latter group consisted of establishments engaged principally in Government contract work.

Looking at the future, the industrial location factors in the Washington area will probably result in concentrating future growth in the suburban area. The industrial development of the central city is likely to remain at or near its present level. The orientation of transportation suggests that the most

TABLE 5. MANUFACTURING INDUSTRY EMPLOYMENT, ACTUAL, and "NORMAL", WASHINGTON METROPOLITAN AREA, MARCH 1953[a]

SIC Code	Industry Group	1953 EMPLOYMENT - - - - - - Actual	"Normal"	ACTUAL INDEX (%)
37	Transportation equipment	2[illegible]14	24,798	8.1
35	Machinery (exc. electrical)	[illegible]25	22,248	2.1
20	Food & beverages	5[illegible]93	17,520	30.7
33	Primary metal	[illegible]23	16,698	0.6
23	Apparel & fabric products	[illegible]24	16,095	0.9
22	Textile mill products	[illegible]0	15,046	0.1
36	Electrical machinery	1,[illegible]47	14,142	9.6
34	Fabricated metal products	1,[illegible]57	14,106	10.9
27	Printing & publishing	10,[illegible]6	9,921	110.5
28	Chemicals & allied products	[illegible]	9,852	9.4
24	Lumber & wood products	[illegible]	9,343	6.3
32	Stone, clay & glass products	[illegible]	6,604	19.1
26	Paper and allied products	[illegible]	6,602	10.7
39	Miscellaneous	[illegible]	6,235	5.0
31	Leather & leather products	[illegible]	4,975	0.5
25	Furniture & fixtures	[illegible]	4,725	12.3
19	Ordnance & accessories	[illegible]	4,130	0
38	Instruments & related products	[illegible]	3,771	24.1
30	Rubber products	[illegible]	3,448	0.1
29	Petroleum & coal products	[illegible]	2,875	3.4
21	Tobacco products	[illegible]	1,113	0
SUM	MANUFACTURING	27,39[illegible]	214,249	12.8
(IMPORTANT SUBGROUPS:)				
271	Newspapers	4,68[illegible]	3,577	131.0
275	Commercial printing	2,54[illegible]	2,678	94.9
27 x	Other printing & publishing	3,33[illegible]	3,665	102.0
372	Aircraft and parts	1,80[illegible]	10,479	17.0
202	Dairy products	[illegible]6	1,251	51.2
205	Bakery products	2,20[illegible]	3,590	61.4
208	Beverage products	[illegible]5	2,529	36.2
366	Communication equipment	1,[illegible]8	6,883	18.0
344	Fabricated structural metal pr.	1,0[illegible]1	3,427	30.7
327	Concrete, gypsum & plaster pr.	[illegible]71	1,212	63.6

[a]Data compiled from County Business Patterns, 1953 (Washington, G.P.O., 1955); missing data estimated

MANUFACTURING EMPLOYMENT–WASHINGTON, D.C. METROPOLITAN AREA

March 1953 data

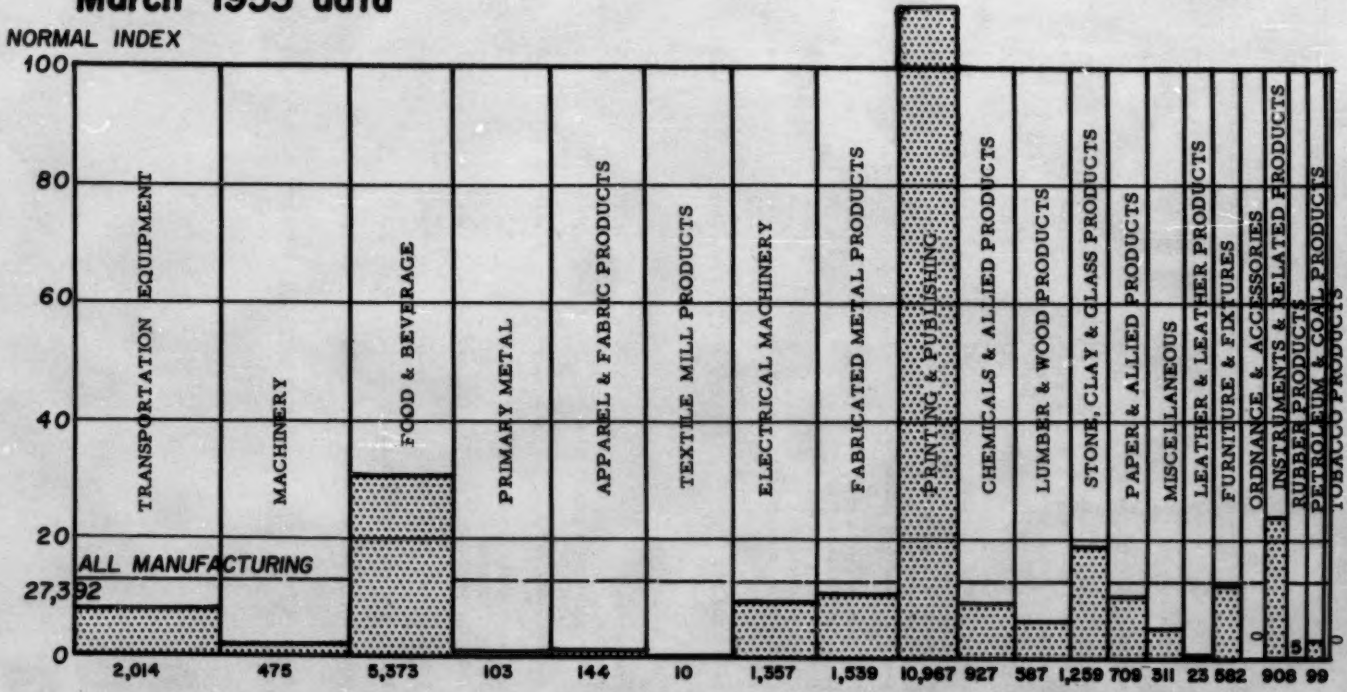

Chart II. Manufacturing Employment, Washington, D. C. Metropolitan Area, March 1953. The width of each bar is proportional to the employment of the industry group in the U.S. as a whole; its height is proportional to the index (see Table 5) of its development in the Washington area; thus, the area of each bar is proportional to the employment in the metropolitan area, shown by the figures at the bottom of the chart.

probable areas of future industrial expansion will lie along railroads and highways northeast of the city (between Washington and Baltimore), northwest of the city, and southwest of the city on the Virginia side. The greatest opportunity for development appears to include market-oriented light industries which will find a growing consumer market of more than 3,600,000 population to service within a 50-mile radius. The three major handicaps limiting industrialization in the past appear to have been: (1) lack of a substantial skilled labor pool; (2) domination of the labor market by a single large employer, the Federal Government; and (3) a community tradition indifferent to industry. The first two adverse factors are less effective at present than they have been in previous periods, and are likely to become less significant in the future, as earnings and economic levels in manufacturing industry increase relative to other area employment. In addition, further automation and investment in manufacturing, with less direct labor input, means that in the future, the Washington area will not offer the same relative disadvantages as in the past. The third factor, community attitude, has changed markedly during the last three years, partly as a result of the general realization that Washington is basically a "one-industry" city, and the efforts of community leaders to spur diversification of the economic development of the area.

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3. Data in this section from U.S. Census Bureau, 1953 Annual Survey of Manufactures Washington, G.P.O., 1955. 228 p.

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Paper 893 CP 1

JOURNAL

CITY PLANNING DIVISION

Proceedings of the American Society of Civil Engineers

TRANSPORTATION PLANNING: THE PORT—A FOCAL POINT[1]

Roger H. Gilman,[2] M. ASCE
(Proc. Paper 893)

FOREWORD

This paper is one of a group given at Princeton University, Princeton, New Jersey, on October 28, 1955, at a special program of the City Planning Division in conjunction with The Green Foundation School of Engineering and The Bureau of Urban Research. It was designed to focus attention on the importance of the function of Transportation and to explore the possibilities for achieving in practice vitally needed coordination of all forms of transportation planning.

The following papers comprise the program: "Transportation Planning: The Port—A Focal Point" (Proc. Paper 893) by Roger H. Gilman, Director of Port Development, Port of New York Authority, New York, N. Y.; "Transportation Planning: The Airport, A National Facility" (Proc. Paper 894) by Wilfred M. Post, Jr., Manager of the Allentown-Bethlehem-Easton Airport, Allentown, Penna.; "Transportation Planning: Prospects For Coordination" (to be published at a later date) by Burton W. Marsh, Director, Traffic Engineering, Automobile Association of America, Washington, D. C.

These papers presented first a discussion of the necessity for coordinated transportation planning in a port area where rail, water, and truck transportation must be planned on the basis of interrelated land use. Then the complex land use patterns involved in airport planning were discussed. One type of needs is generated by an airport as a link in a continental transport system and another often conflicting set of needs is generated by the function of the port as a local land use in the community it serves. Finally a look at the prospects for the coordination of transportation was developed. Such current advances as Atomic power, airport zoning, jet planes, electronic controls and rail-truck "piggy back" operation were related to basic land use, and a basis for discussion of things to come was established.

Note: Discussion open until June 1, 1956. Paper 893 is part of the copyrighted Journal of the City Planning Division of the American Society of Civil Engineers, Vol. 82, CP 1, February, 1956.

1. Before the City Planning Division, American Society of Civil Engineers, Princeton, New Jersey, October 28, 1955.
2. Director of Port Development, The Port of New York Authority, New York, N. Y.

In the field of transportation, the subject of "Planning a Port" embraces a great complex of many forms of transport and related facilities provided by many public agencies and private companies.

At the outset, I suspect that there might be a difference of opinion by some as to just what is meant by the phrase "planning a port." I believe, however, that I am on fairly safe ground if I state that the port is far more than a harbor for marine transportation but rather includes elements of every other form of transportation. While Webster's dictionary might indicate my subject to be more confining in its definition of a port as "a harbor; a haven; a place to which vessels may resort to discharge or receive their cargoes," the City Planning Division, in its wisdom, has rescued me from any such limited discussion by the full title of the topic assigned to me, namely, "Planning A Port—A Focal Point of Transportation."

Look at any city or metropolitan area to which the term "port" is applied today and you will find that it is a focal point for every form of transportation —by water, by land and increasingly by air. A port serves as the target or magnet attracting all modes of transportation. Thus concentrated in a terminal area, the many transport facilities permit the direct and convenient interchange of goods between various parts of this country and of the world. The result of this concentration of transportation service has been that port areas have generally experienced the greatest and most intense developments of population, industry, commerce and trade of all our cities.

Transportation by water obviously assumes first importance as an historical reason for this concentration and development. It is significant that of the 107 cities with a population of 100,000 or more in the United States, only eleven are not located directly on a navigable waterway or along the borders of the Great Lakes or along one of the coastlines of the nation.

In all countries throughout the world, the first communities and later the fastest growing cities were established along the coastlines, where natural harbors and streams permitted sailing craft to serve them more easily and directly than the primitive land vehicles. As far back as 605 A.D. we find the waters of the Thames described as a market for "many nations repairing to them by land and sea." So it has been through history for all ports.

As it became possible in time to clear the forests, span the rivers and cross the hills, roads were built to serve land transport facilities. Within the last century, land transportation by rails and by motor vehicles has become a reality. In the relatively few years of this century, the third element has been added, that of transportation by air.

Unfortunately for planners, as we look at the problem in 1955, a significant part of the growth in transportation and the development of the facilities for those means of transportation had taken place over the years before the role of planning was fully recognized.

To illustrate the problem, consider for a moment some of the transportation developments which have taken place at the Port of New York over the past three centuries. It is typical of what has happened in almost every other community. Starting with the establishment of the first Dutch trading center at the southern tip of Manhattan Island, the past three centuries have seen waterfront facilities built, torn down and re-built by countless private property owners as well as by the individual municipalities located along the navigable rivers and bays, as the harbor area continued to spread. The early post roads and turnpikes, some of them pushed through the countryside back in the Revolutionary War era, still serve as the alignment of many of today's

highways. These older highways as well as the more modern expressways and parkways are the work of many different governmental agencies. Over a hundred years or more ago, the first rail tracks were built into the City of New York, with little if any thought of integration or consolidation among the twelve trunkline railroads now serving this area. Even within the past generation, the Cities of Newark and New York engaged in destructive competition to win supremacy for their individual municipal airports despite the fact that these facilities serve all of the people, industries and trade of the entire Port District of Northern New Jersey and New York.

Lack of integration and cooperation in developing these facilities has of course made more difficult the job of today's planner. To complicate matters further, port areas are usually the central cores of larger metropolitan regions. A port planner is therefore faced with the fact that the port's traffic problems are increasingly overflowing into adjoining communities. That adds to the difficulties, for each municipality or unit of government has its own responsibilities and rights. Within the bi-state Port of New York District, for example, there are 17 counties and well over 200 municipalities. Each has its separate jurisdiction. Thus, the planner at a port as in any local metropolitan region must of necessity be concerned with the multiplicity of agencies of government which exercise power in their respective jurisdictions.

At most American ports, no one single governmental agency has control over the entire waterfront. Rather there is usually a multiplicity of ownerships of the shore properties. Public agencies including cities, public authorities, states and the Federal Government operate piers, drydocks, military bases and other special facilities alongside each other in a single port area. So too, private industries own and operate rail terminals, steamship piers, industrial sites, marine terminals, and a host of other waterfront facilities within the same harbor. Further complicating the planner's job but at the same time making it more exciting, are recent developments in marine transportation and technology which demand new types of facilities at the port.

In recent years, highways in every part of the nation have experienced phenomenal traffic growths. This upsurge demands new vehicular arteries for passenger cars as well as the buses and trucks which are carrying substantial portions of the passenger and freight loads of the nation. Industry has spread to heretofore undeveloped sections of the metropolitan area, with the result that substantial numbers of office and plant workers now commute by car to their places of work outside the central core of the city. As the hours of work have shortened and the hours of leisure have increased, the average American family seems to be determined to spend more of its time in the family car. Our economy is permitting more and more of our people to own a vacation spot at the shore or lakes or in the country, so that the highways are now carrying this further load. The planner of a port must therefore be concerned with the need for arterial highway facilities to take care of the motorist who wishes to by-pass the central and congested city areas for both his business or pleasure travel; with the necessity for major tunnels and bridges to span the rivers and bays of the port; and with the challenge to his ingenuity of improving the movement of traffic on the streets within the heart of the city itself.

Of obvious importance to the complete facilities of a port are the railroads which handle huge volumes of persons and goods moving to and from as well as within the metropolitan area. The port planner must concern himself with the problems which are being experienced by rail carriers throughout the

country, including losses of passenger and freight business to other forms of transportation, their financial difficulties, etc. Yet the railroads must continue to serve as one of the basic forms of transport for any metropolitan area or port in providing mass transportation for passengers and in hauling freight. Again, the planner must take account of many new developments in rail transportation as well as take advantage of what may be a new trend—the willingness of common carriers to integrate and consolidate some of their terminal operations.

For air transportation, the planner is perhaps in a more fortunate position since he is not faced with long-established facilities and traditions requiring major changes to meet today's needs. At the same time, there appears to be a greater willingness on the part of the air industry to experiment and to try new methods of integrating terminal operations which make the planner's efforts and ingenuity more successful and satisfying. On the other hand, there are compensating difficulties which challenge the planner as he provides air transportation facilities for the growing needs of great metropolitan areas.

These are a few of the problems which the port planner faces. At least we have experienced them at the Port of New York. They should not discourage the planner, however, and are not intended to minimize the prospect and hope of success in developing adequate plans. Certainly, they should be a challenge to every responsible official and agency as well as to all of the citizens of a port as they plan improved transportation for the future.

To do less than accept and overcome such challenge will mean a dismal future indeed for a port. There is too much at stake to do otherwise. Within the Port District of Northern New Jersey and New York, we estimate that no less than one out of every ten persons working in this area owes his livelihood directly to the Port and its myriad activities. It is, therefore, incumbent on all public officials as well as private enterprise to cooperate and where possible coordinate their planning efforts.

There are undoubtedly many ways by which plans for a port as a focal point of transportation may be drawn. However, I would like to discuss a few of the activities and programs being undertaken in the Northern New Jersey-New York metropolitan region to illustrate the types of planning carried on at this great Port.

The metropolitan area of New York and Northern New Jersey has an extensive and complex network of land, water and air routes and their respective terminal facilities. They are the product of more than 300 years of the area's growth. The coordination of this vast transportation network has not been entrusted to any one national, state or local agency. Rather, coordination is effected loosely and informally among the many public agencies and private companies. The region's transportation problems are too big, too complex; they involve the responsibilities of too many governmental units and the rights of too many private interests to be solved by unilateral action. They can only be solved by cooperation on a regional level. The port planner must recognize that he cannot expect to mastermind all planning activities as he goes about his job. Rather, he must work with and alongside many others with equal responsibilities.

For example, it is significant to note that in the Comprehensive Plan of The Port of New York Authority, the joint agency established as their joint agency by the States of New York and New Jersey in 1921, the two States stressed the type of cooperative and coordinated planning which should be undertaken in this area. This no doubt could be applied to any large port.

Typically, to quote from the Comprehensive Plan adopted by the two States, the Port Authority, in carrying out its many functions and responsibilities, was directed to "request," "assist," "cooperate," "render advice, suggestion and assistance," etc. Throughout the statute, the stress is on words emphasizing the Port Authority's role as a catalyst in the field of planning. That, to my mind, is the proper role of any metropolitan planning agency under the American system of government with its dependence on local controls.

Marine Transportation

In most American ports there is multiple ownership of waterfront properties. In establishing The Port of New York Authority, the States of New York and New Jersey thus specifically required the consent of the municipality for any development by the Port Authority of marine terminal facilities in which municipal property would be utilized.

Under that assignment of limited powers, the Port Authority today is responsible for developing and operating three marine terminals in the Port—a grain terminal in Brooklyn, the marine terminal at Port Newark and the Hoboken-Port Authority piers. A fourth Port Authority marine development, to cost some $85 million in Brooklyn, will follow the purchase of the New York Dock Company's two-mile stretch of waterfront properties. The balance of the waterfront is owned and operated in part by the City of New York and other municipalities, in part by the Federal Government with its special facilities and in part by private industries which operate marine terminals, rail terminals, steamship facilities, as well as industrial sites.

In all, there are approximately 170 deep-sea piers in the harbor, providing some 325 berths for the handling of general cargo vessels. In terms merely of berthing space, the Port has more than enough piers and wharves. However, much remains to be done to assure that general cargo berths have the supporting modern facilities required to handle today's cargoes.

As at many ports, a good number of the piers in our harbor date from the early part of this century and even back to the last century, well before large over-the-road trucks began to haul a substantial share of import-export freight. Today's planner of general cargo piers should, we believe, provide for single-deck structures, with sufficient widths for truck operations and adequate floor load capacity to permit the high piling of cargoes by modern handling equipment.

Depending upon the channel location, length of space between pierhead and bulkhead lines, availability of level upland areas and accessibility by land transportation, the planner can select the type of pier best suited for a particular section of the waterfront. In some cases, marginal wharf construction parallel to the waterway is the most efficient and economical, while at many harbors it may be advantageous to use finger-type piers.

Since 1946, substantial progress has been made in marine terminal development. In the entire United States during the past ten years, almost $500 million has been spent on new and modernized waterfront facilities. Of this amount, almost $100 million has been spent or committed at the Port of New York. An additional $85 million will be spent by the Port Authority during the next seven years on the improvement of the New York Dock Company properties in Brooklyn. Thus, progress on waterfront facilities will continue for many years to come.

The port planner must of course give careful attention to new development in marine transportation. This is particularly true for the coastwise and intercoastal trade in which an increasing number of new types of vessels are coming into operation, such as the roll-on, roll-off ships for carrying truck trailers; seatrains which haul 100 or more rail cars; and container ships for transporting fully packed containers. All of these are, of course, designed to minimize handling costs and reduce ship turn-around time in port. As a result, there will be a need for specialized facilities at the port for berthing, loading and unloading these vessels.

So too, there will be a need for more specialized facilities to accommodate growing inland waterway operations as well as the increasing imports of specific commodities such as iron ore, newsprint, foodstuffs and bulk liquids. In all of these, careful consideration must be given to their special requirements as to channel depths, wharves, unloading devices, backup spaces for rail cars and trucks.

Highway Transportation

Highway transportation has progressed tremendously throughout the nation in the past thirty years. In the New York-New Jersey metropolitan area alone, almost 600 miles of major arterials, expressways, parkways, bridges and tunnels are now in operation. The construction of this vast arterial highway program has involved an investment over the past thirty years of nearly 1.4 billion dollars. Almost one billion dollars of additional projects are currently under construction and it is estimated that a minimum of almost two billion dollars more will be required within the next few years. Thus, by 1960, a 1000-mile arterial highway network will be available in the New York-New Jersey metropolitan area, involving an investment of four billion dollars of which more than one-half will have been financed by public authorities on the basis of self-supporting facilities. A national highway program of the scope debated in Congress at the last session and certain to come up again next year, would substantially increase even this huge total investment for the region.

The field of highway transportation which involves every level of government—municipal, public authority, county, state and Federal—is one of the best illustrations of cooperative effort by a number of agencies. Obviously, under our system of government, the many responsible highway agencies can only be persuaded, rather than ordered, to develop their streets and highways to conform with an integrated overall highway system. The job of coordinating the planning and construction of expressways, parkways and other arterial highways within the various sections of the New York-New Jersey metropolitan area is tremendous and complex.

However, this very fact has resulted in an awareness by all agencies of the essential need for integrating their activities so that their various parts will form a comprehensive and coordinated metropolitan highway system. It is an established fact that these agencies <u>are</u> cooperating and <u>are</u> working on a day-to-day basis. There is no rigid integration of these various agencies into formal committees. Instead, the responsible public officials, executive heads, highway and traffic engineers, planning experts and others are keeping in close touch with each other on their plans for highway development. They confer frequently, they work together in the development of plans and they are collaborating in the actual construction of many arterial facilities.

This coordination has been and will continue to be developed as the need

arises. I could cite many instances, particularly during recent years, in which four, five and even six separate and independent highway agencies of various governmental units have cooperated in the planning, financing and construction of interchanges, connections and approaches to assure the complete integration of arterial highways, tunnels and bridges.

As an example, The Port of New York Authority and the Triborough Bridge and Tunnel Authority recently pooled their knowledge, experience and past surveys in a year-long Joint Study of those bridges and integrated arterial approach systems which would provide effective relief of the present congention and delays at interstate crossings and overall traffic relief throughout the New York-New Jersey metropolitan area. As a result of that Joint Study in which close contact was maintained with many other highway agencies, the two Authorities in January 1955, proposed the construction at a cost of almost $400 million, of three major bridge projects—a twelve-lane suspension bridge between Brooklyn and Staten Island and spanning the Narrows entrance to New York Harbor from the open sea; a six-lane second deck below the existing George Washington Bridge roadway; and a six-lane Throgs Neck Bridge joining Long Island with the Bronx.

Rail Transportation

In any metropolitan region, the port planner must give serious consideration to the railroads as an essential form of transportation. The development of "piggy-back" operations may help the railroads to retain and increase their transporting of merchandise freight. The planner must concern himself with what these developments mean to the requirements for rail terminal facilities and the overall transportation picture.

The New York-New Jersey metropolitan area is giving increasing attention to the transit problem. Last year, the two States created the Metropolitan Rapid Transit Commission as their joint agency to study the rapid transit needs of the region. Within the past few weeks, the Port Authority and the Metropolitan Rapid Transit Commission have initiated the most comprehensive interstate transit study ever undertaken in the area. The Port Authority is financing at a cost of $800,000 this survey which will be made by leading consultants. This study will endeavor to develop recommendations for maintaining an adequate and feasible system of rapid transit service between New Jersey and New York.

Both agencies have recognized that the development of any practical plan for rapid transit will require a thorough appraisal of the future demand for mass transportation in our metropolitan area. The survey will also consider the possibility of integrating rail transit lines with feeder bus lines and with private automobile travel at the railheads as well as improved bus services where additional investment in rail facilities is not found to be justified. The agreement between the two bi-state agencies also expresses their conviction that no study of the rail commuter problem and a recommended solution would be realistic without developing a constitutionally sound, financially practicable and politically feasible plan of meeting deficits and debt charges if it is determined that such deficits appear to be inevitable.

Air Transportation

The need for close liaison and coordination with other public agencies and

private companies also extends to the planning of metropolitan airports. This type of cooperative consultation and planning is illustrated by the so-called Regional Airport Conference organized immediately after World War II. This group has representatives from the Federal Government, the State governments of New Jersey, New York and Connecticut, the City of New York, Port Authority, Regional Plan Association and the 17 counties of the metropolitan area. The result of the Conference was the formulation of a general plan and program for "Airports of Tomorrow" which helped to crystalize the aviation planning efforts of this region. The study and report were important factors in the evolution of the concept under which the two States authorized their joint agency, The Port of New York Authority, to assume responsibility for developing and operating the major commercial airports of the area.

The role and responsibilities of the Port Authority in planning the airport requirements of the New York-New Jersey metropolitan region is a particularly difficult one. This is so, partly because of the tremendous volume of air traffic and partly because of the fact that the Port Authority is charged by the two States and under the lease agreements with the Cities of Newark and New York, with the responsibility for developing the metropolitan airports on a self-supporting basis.

The Port Authority's airport planning is based on the assumption that air transportation will become the dominant means of long distance travel. We can also expect the role of air transportation to expand into the short-haul travel market, with the helicopter giving increasing air service to the huge short-haul market to nearby metropolitan areas and within the metropolitan areas themselves. The planner will thus have to anticipate the terminal needs and other requirements of helicopter services to and from suburban areas.

The latest Port Authority traffic estimates indicate that by 1965 our airports in the New York-New Jersey metropolitan area will have to accommodate about 15 million passengers a year. To provide the facilities needed to handle this traffic, the Port Authority has already invested over $120 million, and all indications are that additional investments of another $150 million will be required over the next ten years. Our master planning for regional airports illustrates the type of planning required of today's port planner, undreamed of only a generation ago.

Thus, the planner of today's port must concern himself with every form of transportation, giving careful consideration to new developments which are coming along at a rapid pace. Such plans will require integration, coordination and cooperation among all public agencies and private interests to the end that the port may truly become the focal point of an efficient and economical transportation network.

JOURNAL

CITY PLANNING DIVISION

Proceedings of the American Society of Civil Engineers

TRANSPORTATION PLANNING: THE AIRPORT, A NATIONAL FACILITY[1]

Wilfred M. Post, Jr.[2]
(Proc. Paper 894)

FOREWORD

This paper is one of a group given at Princeton University, Princeton, New Jersey, on October 28, 1955, at a special program of the City Planning Division in conjunction with The Green Foundation School of Engineering and The Bureau of Urban Research. It was designed to focus attention on the importance of the function of Transportation and to explore the possibilities for achieving in practice vitally needed coordination of all forms of transportation planning.

The following papers comprise the program: "Transportation Planning: The Port—A Focal Point" (Proc. Paper 893) by Roger H. Gilman, Director of Port Development, Port of New York Authority, New York, N. Y.; "Transportation Planning: The Airport, A National Facility" (Proc. Paper 894) by Wilfred M. Post, Jr., Manager of the Allentown-Bethlehem-Easton Airport, Allentown, Penna.; "Transportation Planning: Prospects For Coordination" (to be published at a later date) by Burton W. Marsh, Director, Traffic Engineering, Automobile Association of America, Washington, D. C.

These papers presented first a discussion of the necessity for coordinated transportation planning in a port area where rail, water, and truck transportation must be planned on the basis of interrelated land use. Then the complex land use patterns involved in airport planning were discussed. One set of needs is generated by an airport as a link in a continental transport system and another often conflicting set of needs is generated by the function of the port as a local land use in the community it serves. Finally, a look at the prospects for the coordination of transportation was developed. Such current advances as Atomic power, airport zoning, jet planes, electronic controls and rail-truck "piggy back" operation were related to basic land use, and a basis for discussion of things to come was established.

Note: Discussion open until June 1, 1956. Paper 894 is part of the copyrighted Journal of the City Planning Division of the American Society of Civil Engineers, Vol.82, CP 1, February, 1956.

1. Prepared for City Planning Division Meeting, October 28, 1955, American Society of Civil Engineers, Princeton University, Princeton, N. J.
2. Manager, Allentown-Bethlehem-Easton Airport, Pennsylvania.

An airport today is the front door to many cities. In the development of transportation, the airplane is becoming increasingly important to the industrial and social growth of any community. A well-equipped, modern airport, efficiently operated, is an important community necessity, just as in the past years water, rail, and highway facilities were important assets. To visitors arriving by airplane, the airport gives the first impression of a city, and citizens and public officials of these cities are increasingly striving to make this impression good. In addition, the Chambers of Commerce are realizing that to make effective bids for new businesses and industries, adequate air transportation facilities are an important requirement.

Although there are certain basic physical requirements for any airport, the adaptation for various communities will vary according to geographic location, population, travel characteristics and circumstances peculiar to each community. Planning for an airport must not only take into effect these factors, but the important matter of finances must also be considered. In this paper, I will attempt to introduce these considerations rather than present a paper basically on airport engineering.

In addition to being a community asset, each airport plays a vital part in the air transportation of the state and nation. An integrated system of airports and a healthy civil aviation industry is necessary for peacetime economy and wartime strength. For such reasons, the federal government and most of the states actively participate in airport planning and development.

Federal aid through the years has come in different forms but in 1946, a grant-in-aid program established through the Federal Airport Act provided authorization for the Civil Aeronautics Administration to share construction costs with municipalities. The intent of the program was good and the first few years brought considerable airport developments as federal funds were matched by local money and in some states by a combination of local and state. However, due to fluctuating amounts appropriated by Congress—in 1954 there were no funds—long range planning and financing was difficult or impossible. This year, (1955) as a result of recent legislation introduced by Senator A. S. Monroney of Oklahoma, and which has now become law, the Civil Aeronautics Administration will be assured of funds for a four year period. Longer range planning and financing can be started.

Public airports can become eligible for inclusion in the federal government's National Airport Plan by qualifying under either of two groups of criteria to measure aeronautical requirements. Airports presently receiving or immediately anticipating airline service may qualify under criteria based on a measurement of such activity. Airports not receiving or immediately anticipating airline service may qualify under criteria based on a measurement of general aviation activity. Cities receiving airline service are classified as Large Hubs, Medium Hubs, Small Hubs, and Non-Hubs dependent on the amount of traffic generated. Depending on the average length of passenger haul, the airports are classified as Intercontinental, Continental, Express, and Trunk of Feeder. These classifications determine the length of runways which for the trunk or feeder catagory are 3500 feet long and 15,000 pound single wheel loading to the Intercontinental or 8400 feet or longer with single wheel loadings of 100,000 pounds. Such runway lengths must be increased for elevation, temperature, and gradient. Recommendations for the other elements such as approach standards, etc. are specified for each type of airport. Airports not having scheduled airline service are rated on the number of based aircraft or other "aeronautical demand modifiers" such as itinerant traffic or

other aviation activity important to the particular community involved.

Although most military bases are separate from commercial airports and will not be discussed in this paper, some locations have proven feasible for joint usage especially for reserve military units and Air National Guard installations. These locations receive special consideration.

Local community finances have naturally dictated much of the local airport planning and development. Methods of money raising and subsequent operation vary widely. Some airports are operated directly by the city or county, some have airport commissions, and others have Authorities. Some airports, usually those of large size are self sustaining and have been financed from revenue bonds. Others, especially those of smaller size, must depend on local subsidy.

It might be interesting to study the story of a medium size trunk line airport serving a small hub area with which I have been associated for over 18 years. There are larger and finer airports than our Allentown-Bethlehem-Easton Airport. There are many smaller and inferior. This story will tell how one group of communities developed and planned their airport.

Early History

The history of the Allentown-Bethlehem-Easton Airport is one of mingled fortunes. Originally, 50 acres of land were leased from a farmer by the Department of Commerce in 1927 as an emergency landing strip for air mail pilots. In 1929 a group of public spirited, air minded business men, supported the Chamber of Commerce, raised $132,000 to purchase the original 317.5 acres of land, construct a hangar and level the ground. When the going became tight, in the early thirties, it became necessary to sell off 50 acres to obtain cash to keep going. This action was later regretted as subsequent expansion required repurchase at three times the amount received for its sale. An enduring lesson was thus learned that the progress of aviation development can never be sold short.

Federal funds became available in the mid thirties and the resulting project to construct the original runways was one of the first in the United States. This CWA work, later to become WPA, was also probably one of the most efficient by virtue of capable local direction and supervision. Three runways resulted from funds originally provided for only one. However, to qualify for these funds, the airport was deeded by the private corporation to the municipalities for $1.00. It is fitting to pay tribute to the late Albert H. Wessel, who began this work for CWA, later to become District Airport Engineer for the Civil Aeronautics Administration until his death in 1954. Through the years he was a staunch friend of the Allentown-Bethlehem-Easton Airport and a hard worker for sound airport development in the state of Pennsylvania.

Formation of the Airport Authority

Toward the end of World War II, in view of expected rapid development in aviation, a joint study group appointed by the Chambers of Commerce recommended to the municipalities that an Authority be established as the most ideal method of developing and operating a public airport. Originally created by the cities of Allentown and Bethlehem, together with Lehigh County, the City of Easton and Northampton County later joined as additional sponsors. For the past five years, the unique venture of three cities and two counties

joining hands in a common enterprise has been most successful. Interest in the Airport Authority has done much to diminish adverse sectionalism between normally competive municipalities. The Lehigh-Northampton Airport Authority was one of the first of its kind in Pennsylvania and following its success, many other municipalities in the state and nation have created similar Authorities to operate their airports.

The fine airport which has resulted, has been the subject of articles in national and international magazines and citizens of the area take justifiable pride in seeing the names of Allentown, Bethlehem, and Easton, appear on airline schedules and maps all over the world.

Economic Advantages

Besides favorable publicity for the sponsors, the creation of the Lehigh-Northampton Airport Authority has had real economic advantages. Its sound sponsorship has been a potent factor in attracting federal and state participation in the expansion of the airport. Since 1946, over $2,000,000 has been spent in its development, yet because of the five way split of local funds, it has only required $.05 from each sponsor to obtain $1.00 worth of construction. The combined $.25 supplied by the five cities has been matched by $.25 from the State and $.50 from Federal Government. No bonded indebtedness has resulted, because none of the five municipalities has been called on to provide more than $20,000 in any one year. Each sponsor has been able to include such an amount in its annual budget. Obviously none of the municipalities could have individually sponsored such an undertaking. To be sure, certain projects could not be provided for in a single year and in such cases, the Authority has been able to borrow money from local banks based on pledges of its five sponsors to provide funds over a period of years. This was done in the construction of the $1,000,000 passenger terminal building. The sponsors' share amounted to $350,000 and the Authority was able to borrow this money locally, and repay it as the sponsors made their contributions over a period of four years. Few airports serving communities of similar size have such a fine building. It not only provides attractive facilities for the air traveler, adequate quarters for the airlines and federal operating agencies, but the space for local businesses and visitors adds to airport revenues. Display cases in the lobby, featuring local manufacturers and their products, were installed through a self-amortizing loan at a local bank. Now paid off, they provide substantial additional income.

Present Facilities

The Allentown-Bethlehem-Easton Airport today, covers more than 500 acres of land. It has three runways, one 5000 feet long, equipped with high intensity lights. An instrument landing system was commissioned in 1954 by the federal government at a cost of $110,000. There are over 35 acres of paving, equivalent to 19 miles of two-lane highways, 9 miles of underground drainage pipe and 8 miles of underground wiring.

The main hangar building provides over 12,000 square feet of hangar and office space for the base operator, where air taxi, aircraft sales, flight training and other services are provided. Income from the base operators' use of these facilities is based on a percentage of gross income and averages $3600 per year. Due to the limited number of Authority employees, the base

operator, on a commission basis, collects the landing and parking fees charged commercial airplanes using the airport. In this building are also located the State Wing headquarters of the Civil Air Patrol and the District Safety Regulations Office of the Civil Aeronautics Administration.

An area on the northside of the airport has been developed for housing the smaller type of airplanes owned by persons and businesses in the area served by the airport. These hangars were constructed through bank loans which are being paid off from revenue derived. Of the original $49,000, only $14,000 remains unpaid. Rentals range from $15.00 to $30.00 per month. 35 airplanes are kept in these buildings.

Two large hangars have been erected by local industries. The Bethlehem Steel Company has one of the finest facilities in the country and now operates two twin engine airplanes. Ground rental is $2000 per year. A smaller hangar constructed in 1953 by the Lehigh Construction Company produces a ground rental of $500 per year.

Adjacent to the main hangar is a restaurant, also built on a self-amortizing loan. It is leased to a concessionairre who has also developed a children's amusement area. Rent, based on a percentage of gross income has been increasing yearly. On the same rental basis, a golf driving range has been developed along the entranceway to the terminal building.

The Pilot's Club, located adjacent to the southwest corner of the airport on its own land, now has a membership of over 400 and has recently completed construction of a swimming pool which, during the summer months attracts local and visiting aviation enthusiasts.

Located in the new terminal building is the U. S. Department of Commerce Weather Bureau which not only provides weather information and forecasts to aircraft pilots, but offers valuable weather service to farmers, manufacturers, contractors, transportation systems, the highway department, newspapers, radio and TV stations, and the general public. It also issues flood warnings for the Lehigh and Lackawaxen rivers. The Control Tower supervises an average of 5000 take offs and landings each month. The operation of the instrument landing system is monitored in this tower. The Airways Communications Station is another federal agency and has been recently merged with the control tower. Located at the intersection of five federal airways, it coordinates the majority of east and westbound air traffic to and from the New York Metropolitan area under the direction of the Air Route Traffic Control Center in New York. Over 50,000 airplane contacts are handled each year. It is one of the busiest of such facilities in the United States. In as much as federal funds were used in the construction of this building, the Authority cannot charge these facilities rent. However, they pay for light, heat, and janitor service.

Scheduled Air Service

The Allentown-Bethlehem-Easton Airport is served by three airlines with 14 daily flights. United Air Lines has been operating since 1935, Trans World Airlines since 1947, and Colonial Airlines since 1950. Passengers boarded and deplaned have increased from 9161 in 1947 to almost 45,000 in 1954. Substantial increases have also occurred in air freight, air express, and air mail. Due to increased business, the airlines have agreed to an increase in landing fees and space rent in the terminal building. These new landing fees are computed on a weight frequency basis which begins at $.095 per thousand pounds

maximum gross landing weight per aircraft landing. Volume discounts of $.01 per thousand pound integrals apply after the first 150 scheduled landings per month. Ticket counter and office space in the terminal building rent at $3.50 per square foot per year. Parking fees are charged all aircraft remaining at the airport for over one hour with the exception of those owned by the Government. Itinerant airplanes using the airport for commercial purposes are charged a landing fee based on the size of the airplane. Personal owned airplanes on pleasure or training flights are still not charged a landing fee. It is felt that at airports such as ours, this phase of flying still needs encouragement.

Other Revenue

Perimeter land owned by the Authority outside the landing field is leased for farming purposes. Several areas between the runways are also in the experimental stages of farming. Due to the underground limestone structure, alfalfa has been determined to be the best crop. Anything requiring yearly plowing or growing too high to impede visibility, has not been used because of fear of aggravating a sink hole condition peculiar to this area. If successful and sink holes do not develop because of improper surface drainage, more such areas will be leased to decrease maintenance expense and increase income.

Income and Expenses

The airport still operates at a modest deficit but income has risen from $27,067 in 1947 to $70,475 in 1954. However, due to the necessary expansion of facilities and the time required for their full utilization, expenses have increased to $85,289. The deficit is made up from allocations of the sponsors annual contributions. Depreciation and amortization are not included in the expenses.

Zoning and Obstruction Removal

In 1955, after two years of preparation, vertical zoning resolutions were passed by Lehigh and Northampton counties. A very small percentage of airports in the United States have completed such zoning programs and this forward looking step insures clear approaches to the runways and protection of the great investment in the airport. In some cities runways have been closed and the entire investment in the airport imperiled, because of lack of such foresight in not being able to prevent the erection of obstructions. One project totalling $120,000, participated in by the Federal and State Government, providing for clearing approaches to one end of the Instrument Landing Runway is nearing completion and another such project which will clear obstructions on the other end, has been approved for $255,000.

Airport Maintenance

A crew of 11 maintenance workers take care of all the buildings, roads, and landing field. Snow removal in the winter and grass mowing in the summer, in addition to the maintenance of the field lights and runways are only a few of the many tasks performed by this versatile crew. Of great financial

help in the airfield maintenance work is the Airport Safety Improvement Program, which is carried on by the Pennsylvania Aeronautics Commission. In this program, one half of the state tax on aviation gasoline sold at the airport is returned for one half the cost of approved airfield maintenance projects. In 1954, the state portion, as a result of increased gasoline sales, totaled $4000.

Fire and crash protection is coordinated by the Authority between the operating companies on a cooperative, volunteer basis, backed up by the municipal fire departments which respond to calls. In this emergency plan the airport jeep fire truck is manned by volunteers supplied by the three airlines. Additional equipment is supplied by the Bethlehem Steel Company, Lehigh Construction Company and the base operator. During 1954, equipment and personnel stood by for 16 emergencies but fortunately no fires or injuries resulted.

The Authority Board

The greatest asset of the Authority are the civic leaders who have volunteered to serve on the Board of Governors, when asked by their municipalities. The Airport Authority is made up of a Board of fifteen members. Each of the five sponsoring municipalities appoints one person every year for a term of three years. The Board members serve without compensation. Due to the complexity of developing and operating an airport, this is an unusually hard working Board and considerable amounts of time is required of many of its members. Five standing committees are appointed which consist of Construction, Management, Finance, Publicity, and Operations. For instance, the Operations Committee meets at the airport weekly to see that the appearance is good and to discuss the inumerable details of maintenance. It is constant inspiration that busy men, spend so much time in the affairs of the airport. This fine leadership has produced substantial cooperation from industries who have given great assistance in many ways, even to the extent of assistance in acquisition of land for future expansion.

Much forethought and planning will be required in the years to come. Each community will have its own local circumstances to consider in addition to the requirements of the airplanes planned to be put into service by the operating companies using that airport. Undoubtedly jet airplanes will require longer runways. Helicopters and convertiplanes will require no runways at all. Just what will be needed at ours and other airports, and what the communities can finance, will take intensive study as the requirements of proposed airplanes are developed.

One factor is certain, however, Each commuhity will need a basically sound organization. We feel that we have such an organization in the Lehigh Valley, because the Lehigh-Northampton Airport Authority has been a successful operation in every respect. We are sure that the challenge of the future will be met here and throughout our nation by similar groups and by virtue of foresightedness and hard work of their members, aided by competent consultants and state and federal agencies, airport development will continue to become a great local and national asset.

DIVISION ACTIVITIES

CITY PLANNING DIVISION

Proceedings of the American Society of Civil Engineers

NEWSLETTER

February, 1956

Honorary Member - PARK H. MARTIN

The Division was extremely proud at the election of Park H. Martin to Honorary Membership of ASCE in June, 1955. This is the first time that a representative of the City Planning Division has been so honored. In the Society's entire 103 years of existence only 168 persons have held Honorary Membership, which Past-President Glidden termed "the highest recognition of acknowledged eminence in the profession." Presently there are 41 of the maximum 50 allowed. Presentation was made at the Membership Luncheon in New York last October.

Mr. Martin was hailed as "planning and executive genius, famous Pittsburgh engineer, leader in a major improvement program that exemplifies community planning at its best." He has been for the last ten years executive director of the Allegheny Conference on Community Development—a private, non-profit citizens' organization composed of leading industrialists, businessmen and public officials, which has spearheaded Pittsburgh's Renaissance and brought into realization many of the projects that make it the great city it is. For further details of Mr. Martin's extensive background and offices please review the article in "Civil Engineering" for September, 1955 on page 70.

Other noteworthy recognitions were election to the presidency of American Society of Planning Officials (ASPO) for 1955-56, one of the few honorary doctorates of engineering from his alma mater Carnagie Institute of Technology, and the first civic award of the Pittsburgh Section of which he was president.

Park Martin's accomplishments do not deter him from undertaking more duties toward advancing the profession. In addition to his heavy schedule as ASPO President, he serves on the Division's Executive and Session Programs Committees, and general chairman of the Society's Annual Convention at Pittsburgh, October, 1956.

Note: No. 1956-4 is part of the copyrighted Journal of the City Planning Division of the American Society of Civil Engineers, Vol. 82, CP 1, February, 1956.

ASCE Papers of City Planning Interest

A number of division members have indicated since the June 1955 Newsletter that they would be interested in obtaining a complete file of City Planning Division Proceedings Papers. Listed below are papers published by the Society that you may wish to check against those you already have. The list includes all those sponsored by the division that are still available from 1940 to date plus a number of others of planning concern. All orders are to be sent to Headquarters in New York.

TRANSACTIONS REPRINTS are to be preferred to the original Proceedings Papers because of their inclusion of all discussions and the author's closing discussion. Prices to members are now a uniform 50 cents ($1.00 for symposia) half the list price.

Reprint No.

1940

2061 "Transportation Developments in the United States." F. Lavis

2063 "Traffic Problems in Metropolitan Areas." Earl J. Reeder

1941

2104 "Bridge and Tunnel Approaches." John F. Curtin

2107 "Channelization of Motor Traffic." Guy Kelcey

2109 "Measuring the Potential Traffic of a Proposed Vehicular Crossing." N. Cherniack

1942

2155 "Traffic Engineering as Applied to Rural Highways." Milton Harris

1943

2171 "Development of Transportation in the United States." J. E. Teal

1946

2279 "Elimination of Cross Connections in Los Angeles, Calif." Harry Hayes

1947

2309 "Express Highway Planning in Metropolitan Areas." Joseph Barnett

1950

2393 "Cities Cannot Live without Trucks." Hoy Stevens

2395 "The Relation of Urban Expressways to Mass Transportation Facilities." Curtis G. Bradfield

2399 "Property Surveys Must Fit Their Titles." William C. Wattles

1952

2477 "Highway Planning in Turkey." H. E. Hilts

2482 "Planning the National Capital: Objectives and Problems of Attainment." Ulysses S. Grant, III

2485 "International Cartography." Robert H. Randall

Reprint No.

2488 "National Geodesy-Status and Planning." Leo Otis Colbert

2491 "Surveying and Mapping Requirements for Modern City Planning." Charles A. Blessing

2492 "The New Towns Program in Great Britain." T. C. Coote

2503 "National Topographic Mapping." E. E. Wrather

2515 "Friendship International Airport." Benjamin Everett Beavin, Sr.

2519 "Application of Highway Capacity Research." J. P. Buckley

2521 "Principles of Highway Capacity Research." O. K. Normann

1953

2545 "The Allegheny Conference-Planning in Action." Park H. Martin

2558 "The Value and Administration of a Zoning Plan." Huber Earl Smutz

2574 "Review of Flood Frequency Methods": Final Report of the Subcommittee of the Joint Division Committee on Floods.

2584 "Engineers' Contribution in Developing American Cities." Harold M. Lewis

2585 "Today's Engineer and Tomorrow's Metropolitan Problems." L. P. Cookingham

2586 "America's Costliest Bedrooms: The Suburbs." Richard G. Baumhoff

2638 "Solving Highway Traffic Problems." D. Grant Mickle

1954

2662 "Unified Mass-Transportation System for New York." William Reid

2665 "City Planning Techniques." Russell H. Riley

2670 "Zoning Maps for Airports." Benjamin Everett Beavin, Sr.

2681 "Recent Airport Design and Development." Philip A. Hahn

2693 "The Engineer's Role in Metropolitan Traffic Planning." Lloyd Braff

2707 "An Interstate Route and Its Urban Connections." D. W. Ormsbee

PROCEEDINGS—PAPERS sponsored by a division are sent bound in a DIVISION JOURNAL automatically to a member of that division. In addition he may order up to 100 free papers in any one calendar year. Beyond the 100, for duplicate copies, or for papers of previous years there is a charge of 25 cents, half the list price. Be sure to keep up-to-date by checking the coupons for first-preference City Planning Division membership and for current issues in the rear pages of "Civil Engineering" each month. You may also receive publications of another division automatically by notifying Society Headquarters that it is your second-preference affiliation.

Separate No.

1953

234 "Appraisal of One-Way Street System in Sacramento, California." D. J. Faustmann.

285 "Community and Neighborhood Development." Russell H. Riley

305 "Surveys and Maps-Vital to the Solution of Problems of Mass Transportation." Benjamin Everett Beavin, Sr.

1954

408 "Georgia's Proposed Plat Law." C. R. Roberts

423 "The Training of City Planners." Howard K. Menhinick

487 Discussion of "Proceedings" - Separates No. 191, 196 and 423(CP)

507 "A Steel Plant's Effect on Regional Planning and Development." Russell VanNest Black

508 "Philadelphia Capital Budget and Program Procedures." Charles A. Howland

509 "History of the City Planning Division of the ASCE." Harry W. Alexander

510 "Is Parking a Public Responsibility?" William R. B. Froehlich

511 "Solving the Engineering Problems of Metropolitan Areas." G. H. Herrold

525 "Discussion of Proceedings-Separates No. 277, 305, 393, 407 and 415

574 "Photogrammetry in City Planning and Operations." Louis A. Woodward

577 "Photogrammetry Aids the Pennsylvania Turnpike." G. B. Gilbert

581 "Photogrammetry and its Application." A. O. Quinn

1955

599 "Private Enterprise Can Meet the Parking Demand." C. T. McGavin

600 "Denver's Master Street Plan." John S. Marshall

601 "Pittsburgh's Comprehensive Improvement Program." Park H. Martin

602 "Organization for Metropolitan Traffic and Transportation Planning." Charles A. Blessing

603 "Integration of Local Streets with the Atlanta Expressway System." Karl A. Bevins

614 "Development of the Port of Lake Charles, La." Elmer E. Shutts

615 "Modern Design of General Cargo Marine Terminals." Frank W. Herring

710 "Is Subsidy Necessary for Adequate Mass Transit? Charles E. De Leuw

711 "The Development of the Mission Bay-San Diego River Project." Glenn A. Rick

712 "The San Francisco Bay Area Mass Rapid Transit Study." R. F. Ziegenfelder

Separate No.

1955

713 "Discussion of Proceedings Papers 423, 508, 509 and 510." (CP)

723 "Federal Participation in Small-Craft Harbors." Lyman A. Markel

724 "Proposed Modern Marine Terminal at San Diego." Joachim E. Liebmann

725 "Design Problems-Alamitos Bay Marina." George F. Nicholson

766 "Environmental Considerations in the Development of the Atomic Energy Industry." Arthur E. Gorman

767 "Prospects for Use of Nuclear Power." H. W. Huntley

768 "Elementary Principles of Nuclear Power." John W. Landis

769 "Some Observations on the Urban Transportation Problem." Harmer E. Davis

770 "Water Supply and Sewerage System Planning for Greater Karachi." Carroll V. Hill and Vance C. Lischer

778 "Transport Helicopter Cost and Heliport Considerations." F. David Schnebly

785 "Urban Renewal and the Rebuilding of American Cities." J. W. Follin

803 "Flood Control in the Middle Mississippi." Walter F. Lawlor

832 "Discussion of Proceedings Papers 541, 679, 680, 683, 684, 786." (ST)

833 "Local Government in the Atomic Age." Harold F. Alderfer

834 "Planning New Cities: Problems, Techniques and Solutions." Albert Mayer (CP)

835 "Discussion of Proceedings Papers 508, 710." (CP)

"CIVIL ENGINEERING" ARTICLES are not available as separate reprints unless individual orders are received for more than 100 copies of a single paper. Below are most of those since 1950 with city planning implications.

1950

Mar. "Comprehensive Planning Can Solve Metropolitan Transportation Problems." L. Williams

May "San Diego Plans $26,000,000 Playground." G. A. Rick

June "Must New Highway Construction Soon Become Overloaded and Obsolete?" F. Grumm

Sep. "What is Being Done to Meet the Housing Shortage?" A. Kervick

1951

Feb. "Chicago Builds $230,000,000 Superhighway System." V. E. Gunlock

Mar. "Houston Urban Expressways Promise Savings of $2,750,000 Annually." W. J. Van London

1951

Apr. "Block Size Bus Terminal Alleviates Traffic Congestion in New York." J. M. Kyle

Jul. "Expressways & Railroads Integrated in Louisville's City Plan." C. deLeuw

Oct. "Is the Growth of Our Cities Properly Guided?" H. Bartholomew

Dec. "Los Angeles Constructs 2,000 car Underground Garage." C. A. McMahon

1952

Feb. "More Accurate Population Estimates By Means of Logistic Curve." J. E. McLean

Apr. "Proposed Mississippi River Parkway to Utilize Existing Highways." J. L. White.

May "New Orleans Builds $50,000,000 Union Passenger Terminal Project."

Sep. "The Changing Picture in Highway Traffic." D. G. Mickle

Sep. "Our Expanding Cities Demand Good Planning." L. V. Sheridan

Dec. "Tunnel & Viaduct to Ease Seattle's Traffic Troubles." R. W. Finke

1953

Apr. "San Francisco's Broadway Tunnel Completed." R. G. Wadsworth

Jun. "Pittsburgh Plans New Bridges & Traffic Interchange." G. Richardson

Dec. "Mass Transportation-Can We Afford It?" M. Nadler

1954

Jan. "Buildings No Barrier to Chicago's Congress St. Superhighway." V. E. Gunlock

Jan. "Detroit Pushes Expressway System Through Urban Area." H. C. Coons

Mar. "Atlanta Builds Freeway." M. E. Cox, L. H. Lyle & R. C. Tate, B. P. McWhorter

May "St Mary's Square Underground Garage Under Construction." J. J. Gould

Jul. "Expressway Crosses New Haven Harbor Front on Hydraulic Fill." E. T. Perkins

Dec. "Corlears Hook Apartment Project." M. Barron and N. Farkas

1955

Feb. "Urban Heliports Are on the Way."

Apr. "A Monorail System For Los Angeles." G. W. Burpee

Jun. "Parking Garage Built for $5.83 per sq. ft. in San Francisco." W. H. Ellison & T. Y. Linn

Jul. "How St. Louis Analyzed to Traffic Problem." M. Ableman

1955

Aug. "V-type System Proposed For Elevated Rapid Transit." H. zur Nieden

Aug. "Chicago Parking Garage Features Cable Barrier." C. A. Metz

You may wish to further investigate all papers published by the Society for the last few years by obtaining from Headquarters:

Price List 1954-1	(Trans. Reprints and Proceedings-Separates)
Proceedings Paper 582	(Index to Proceedings 1950-1954 by subject and author)
Proceedings Paper 860	(Index to Proceedings 1955 by subject and author)
Annual Indexes	("Civil Engineering" articles)

It is planned that Proceedings annual indexes will be advertised each January in "CIVIL ENGINEERING."

DIVISION MEMBERS BY LOCATION

The Division Secretary has compiled a geographical roster of ASCE members who have chosen the City Planning Division as their first-preference affiliation. This roster further supplements the Society's Directory and Directory Supplement which must still be consulted for complete mailing addresses. These have been sent to the executive committee and division committee chairman, but some are still available. Should you like a copy, address your request to Francis O. Clark, City Plan Commission, 801 City-County Building, Detroit 26, Michigan.

New Executive Committee Member - J. CAL CALLAHAN

J. Cal Callahan was appointed by the Board of Direction to the City Planning Division Executive Committee to replace the retiring member, Leslie Williams. He is chief of the planning division of Morris Knowles, Inc. and consultant to five planning and redevelopment agencies in the Easton-Bethlehem area of Pennsylvania. His schooling was received at Xavier University and University of Michigan.

Mr. Callahan as Chairman of the Cooperation with Local Sections Committee, has inaugurated Division conferences at universities in the regions of the Annual ASCE convention. With a singular charm and intrepidity he organized two successful meetings led by speakers of national prominence: October 1954-Lehigh University and Lafayette College, Pennsylvania-"Regional Planning and Atomic Fuel"; October 1955-Princeton University, N. J.-"Transportation Planning." He is now preparing a third for October, 1956 to follow the Pittsburgh convention and also serves as liaison contact with local sections for the Session Programs Committee.

A word on how your executive committee is chosen was requested by the present members at their November meeting in Pittsburgh. The names of three candidates are submitted to the Board of Direction once a year for the appointment of one to replace a retiring member. These candidates are selected on the basis of professional competence, interest and willingness to contribute to ASCE work, and geographical distribution. Beginning next year there will be four members of four year overlapping terms. The Secretary will be a fifth member requiring annual election by the committee itself.

It is intended that each zone shall be represented. To this end local sections suggest persons each year to replace a retiring member if he represented their zone of the country.

You should know some of the eminent candidates who were also nominated the past few years:

1955 - Eldridge H. Loveland Partner	Harland Bartholomew & Assoc. St. Louis, Mo.
1955 - Louis C. Bisso Dir.-Secy.	City Planning Commission New Orleans, La.
1954 - Charles A. Howland Planning Engr.	Phila. Planning Commission Philadelphia, Pa.
1954 - William H. Claire Asst. Exec. Dir.	Community Redev. Agcy. Los Angeles, Calif.
1953 - Paul E. Middleton Head, Eng. Sect.	Div. of Slum Clearance HHFA Washington, D. C.

COMMITTEE ADDITIONS - Since January, 1955

Executive	: J. Cal Callahan	Easton, Pa.
Publications	: Nathan Cherniack	New York, N. Y.
	George E. Lommel	W. Lafayette, Ind.
	Frank H. Malley	Providence, R. I.
	John Nolen, Jr.	Washington, D. C.
	Russell H. Riley	St. Louis, Mo.
Urban Renewal	: Paul E. Middleton	Alexandria, Va.
Newsletter Editor	: Francis O. Clark	

PROCEEDINGS PAPERS

The technical papers published in the past year are identified by number below. Technical-division sponsorship is indicated by an abbreviation at the end of each Paper Number, the symbols referring to: Air Transport (AT), City Planning (CP), Construction (CO), Engineering Mechanics (EM), Highway (HW), Hydraulics (HY), Irrigation and Drainage (IR), Power (PO), Sanitary Engineering (SA), Soil Mechanics and Foundations (SM), Structural (ST), Surveying and Mapping (SU), and Waterways (WW) divisions. Papers sponsored by the Board of Direction are identified by the symbols (BD). For titles and order coupons, refer to the appropriate issue of "Civil Engineering." Beginning with Volume 82 (January 1956) papers were published in Journals of the various Technical Divisions. To locate papers in the Journals, the symbols after the paper numbers are followed by a numeral designating the issue of a particular Journal in which the paper appeared. For example, Paper 861 is identified as 861 (SM1) which indicates that the paper is contained in issue 1 of the Journal of the Soil Mechanics and Foundations Division.

VOLUME 81 (1955)

FEBRUARY: 608(WW), 609(WW), 610(WW), 611(WW), 612(WW), 613(WW), 614(WW), 615(WW), 616(WW), 617(IR), 618(IR), 619(IR), 620(IR), 621(IR)[c], 622(IR), 623(IR), 624(HY)[c], 625(HY), 626(HY), 627(HY), 628(HY), 629(HY), 630(HY), 631(HY), 632(CO), 633(CO).

MARCH: 634(PO), 635(PO), 636(PO), 637(PO), 638(PO), 639(PO), 640(PO), 641(PO)[c], 642(SA), 643(SA), 644(SA), 645(SA), 646(SA), 647(SA)[c], 648(ST), 649(ST), 650(ST), 651(ST), 652(ST), 653(ST), 654(ST)[c], 655(SA), 656(SM)[c], 657(SM)[c], 658(SM)[c].

APRIL: 659(ST), 660(ST), 661(ST)[c], 662(ST), 663(ST), 664(ST)[c], 665(HY)[c], 666(HY), 667(HY), 668(HY), 669(HY), 670(EM), 671(EM), 672(EM), 673(EM), 674(EM), 675(EM), 676(EM), 677(EM), 678(HY).

MAY: 679(ST), 680(ST), 681(ST), 682(ST)[c], 683(ST), 684(ST), 685(SA), 686(SA), 687(SA), 688(SA), 689(SA)[c], 690(EM), 691(EM), 692(EM), 693(EM), 694(EM), 695(EM), 696(PO), 697(PO), 698(SA), 699(PO)[c], 700(PO), 701(ST)[c].

JUNE: 702(HW), 703(HW), 704(HW)[c], 705(IR), 706(IR), 707(IR), 708(IR), 709(HY)[c], 710(CP), 711(CP), 712(CP), 713(CP)[c], 714(HY), 715(HY), 716(HY), 717(HY), 718(SM)[c], 719(HY)[c], 720(AT), 721(AT), 722(SU), 723(WW), 724(WW), 725(WW), 726(WW)[c], 727(WW), 728(IR), 729(IR), 730(SU)[c], 731(SU).

JULY: 732(ST), 733(ST), 734(ST), 735(ST), 736(ST), 737(PO), 738(PO), 739(PO), 740(PO), 741(PO), 742(PO), 743(HY), 744(HY), 745(HY), 746(HY), 747(HY), 748(HY)[c], 749(SA), 750(SA), 751(SA), 752(SA)[c], 753(SM), 754(SM), 755(SM), 756(SM), 757(SM), 758(CO)[c], 759(SM)[c], 760(WW)[c].

AUGUST: 761(BD), 762(ST), 763(ST), 764(ST), 765(ST)[c], 766(CP), 767(CP), 768(CP), 769(CP), 770(CP), 771(EM), 772(EM), 773(SA), 774(EM), 775(EM), 776(EM)[c], 777(AT), 778(AT), 779(SA), 780(SA), 781(SA), 782(SA)[c], 783(HW), 784(HW), 785(CP), 786(ST).

SEPTEMBER: 787(PO), 788(IR), 789(HY), 790(HY), 791(HY), 792(HY), 793(HY), 794(HY)[c], 795(EM), 796(EM), 797(EM), 798(EM), 799(EM)[c], 800(WW), 801(WW), 802(WW), 803(WW), 804(WW), 805(WW), 806(HY), 807(PO)[c], 808(IR)[c].

OCTOBER: 809(ST), 810(HW)[c], 811(ST), 812(ST)[c], 813(ST)[c], 814(EM), 815(EM), 816(EM), 817(EM), 818(EM), 819(EM)[c], 820(SA), 821(SA), 822(SA)[c], 823(HW), 824(HW).

NOVEMBER: 825(ST), 826(HY), 827(ST), 828(ST), 829(ST), 830(ST), 831(ST)[c], 832(CP), 833(CP), 834(CP), 835(CP)[c], 836(HY), 837(HY), 838(HY), 839(HY), 840(HY), 841(HY)[c].

DECEMBER: 842(SM), 843(SM)[c], 844(SU), 845(SU)[c], 846(SA), 847(SA), 848(SA)[c], 849(ST)[c], 850(ST), 851(ST), 852(ST), 853(ST), 854(CO), 855(CO), 856(CO)[c], 857(SU), 858(BD), 859(BD), 860(BD).

VOLUME 82 (1956)

JANUARY: 861(SM1), 862(SM1), 863(EM1), 864(SM1), 865(SM1), 866(SM1), 867(SM1), 868(HW1) 869(ST1), 870(EM1), 871(HW1), 872(HW1), 873(HW1), 874(HW1), 875(HW1), 876(EM1)[c], 877 (HW1)[c], 878(ST1)[c].

FEBRUARY: 879(CP1), 880(HY1), 881(HY1)[c], 882(HY1), 883(HY1), 884(IR1), 885(SA1), 886(CP1), 887(SA1), 888(SA1), 889(SA1), 890(SA1), 891(SA1), 892(SA1), 893(CP1), 894(CP1), 895(PO1) 896(PO1), 897(PO1), 898(PO1), 899(PO1), 900(PO1), 901(PO1), 902(AT1)[c], 903(IR1)[c], 904 (PO1)[c], 905(SA1)[c].

c. Discussion of several papers, grouped by Divisions.

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APRIL: 659(ST), 660(ST), 661(ST)[c], 662(ST), 663(ST), 664(ST)[c], 665(HY)[c], 666(HY), 667(HY), 668(HY), 669(HY), 670(EM), 671(EM), 672(EM), 673(EM), 674(EM), 675(EM), 676(EM), 677(EM), 678(HY).

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AUGUST: 761(BD), 762(ST), 763(ST), 764(ST), 765(ST)[c], 766(CP), 767(CP), 768(CP), 769(CP), 770(CP), 771(EM), 772(EM), 773(SA), 774(EM), 775(EM), 776(EM)[c], 777(AT), 778(AT), 779(SA), 780(SA), 781(SA), 782(SA)[c], 783(HW), 784(HW), 785(CP), 786(ST).

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c. Discussion of several papers, grouped by Divisions.

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